Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (previously presented) A laser-based device for non-mechanical, three-dimensional trepanation during cornea transplants, comprising

- a computer-assisted control and regulation unit (4) provided with at least one control computer (5, 6, 7) and at least one display unit (8, 9),
- a laser source (2) for generating a working laser beam (3), and
- a multi-sensor processing head (1) integrated into which are:

= an axial beam guiding system (11) into which the working laser beam (3) is coupled,

= a focal point tracking unit (12) for a z-position displacement of a focal point (13) of the working laser beam (3),

= an x-y-scanner unit (14, 15) for a x- and y-position displacement of the working laser beam (3),

= an eye position sensor unit (23, 24, 35, 36) for detection of a position of the eye, and

= a plasma sensor unit (16, 25) for detection of a plasma glow that occurs during the cornea trepanation, which plasma

sensor unit (16, 25) is coupled with the control computer (5, 6, 7), which controls the laser on the basis of data derived by said plasma detection.

2. (currently amended) A trepanation device according to claim 1, ~~characterized by~~ comprising an adjusting laser (17) whose visible adjustment beam is coupled into the axial beam guiding system (11) via a deflection prism (18) that is positionable in x-y-z direction.

3. (currently amended) A trepanation device according to claim 1~~ or 2~~, ~~characterized by~~ comprising an infrared illuminating unit (19) whose infrared beam (20) is coupled into the axial beam guiding system (11) via a deflection prism (21) that is positionable in x-y-z direction.

4. (currently amended) A trepanation device according to ~~any of the above claims~~claim 1, ~~characterized in that~~ wherein the focal point tracking unit (12) comprises one of adaptive optics and a displaceable telecentric focussing lens (37).

5. (currently amended) A trepanation device according to ~~any of the above claims~~claim 1, ~~characterized in that~~ wherein the x-y scanner unit comprises a rough adjustment unit (14) with two adjusting axes (26, 27) and a fine adjusting unit (15) preferably with piezo-driven tilting mirrors (33, 34).

6. (currently amended) A trepanation device according to claim~~s 4 and 5~~1, ~~characterized in that~~ wherein the x-y scanner unit (14, 15) and the focal point tracking unit (12) comprise position feedback outputs, which are

coupled with the control and regulation unit (4) for controlling the actual x-y-z position of the focal point (13) of the working laser beam (3).

7. (currently amended) A trepanation device according to ~~any of the above claims~~claim 1, ~~characterized in that~~ wherein the eye position sensor unit comprises two CCD line scan cameras (23, 24) that are orthogonal in their line orientation.

8. (currently amended) A trepanation device according to ~~any of the above claims~~claim 1, ~~characterized in that~~ wherein the eye position sensor unit comprises two laser distance sensors (35, 36), one of which determines its distance to the center of the cornea being treated and the other determines its distance to a rim point of the cornea.

9. (currently amended) A trepanation device according to ~~any of the above claims~~claim 1, ~~characterized in that~~ wherein the plasma sensor unit is formed by one of a CCD area scan camera (25) for position-resolved detection of the plasma glow and a plasma sensor (16).

10. (currently amended) A trepanation device according to claim 9, ~~characterized in that~~ wherein the image data of the CCD area scan camera (25) is used for determining the pupil contour of the eye being treated.

11. (currently amended) A trepanation device according to ~~any of the above claims~~claim 1, ~~characterized by~~ wherein a laser output sensor (22) in the multi-sensor processing head (1).

12. (currently amended) A trepanation device according to ~~any of the above claims~~claim 1, ~~characterized in that~~ wherein a surgery microscope (32) is integrated into the multi-sensor processing head (1).

13. (currently amended) A trepanation device according to ~~any of the above claims~~claim 1, ~~characterized in that~~ wherein the control and regulation unit (4) comprises a central control computer (5), a positioning computer (6) that is coupled with the CCD line scan cameras (23, 24) and with the infrared illuminating unit (19), and a control computer (7) that is coupled with the CCD area scan camera (25).

14. (currently amended) A trepanation device according to ~~any of the above claims~~claim 1, ~~characterized in that~~ wherein the display unit comprises multiple displays (8, 9) for displaying a real-time image of the eye being treated with the plasma glow and displaying planning, monitoring and simulation images and data.